GHG levels increasing at a faster rate), 7 of 11 models with available data obtain an abrupt retreat in the ice cover; the abrupt events last from 3 to 10 years (Holland et al. 2006, pp. 1–5).

In order to increase confidence in climate model projections, several studies have sought to constrain the number of models used by validating climate change in the models simulations against actual observations (Knutti et al. 2006; Hall and Ou 2006). The concept is to create a shorter list of ''higher confidence'' models by removing outlier model projections that do not perform well when compared to 20th century observational data (Overland and Wang 2007a, pp. 1–7). This has been done for temperatures (Wang et al. 2007, pp. 1,093–1,107), sea ice (Overland and Wang 2007a, pp. 1–7; Stroeve et al. 2007, pp. 1–5), and sea level pressure (SLP; defined as atmospheric pressure at sea level) and precipitation (Walsh and Chapman, pers. comm. with J. Overland, NOAA, cited in litt. to the Service, 2007).

Overland and Wang (2007a, pp. 1–7) investigated future regional reductions in September sea ice area utilizing a subset of AR4 models that closely simulate observed regional ice concentrations for 1979–1999 and were driven by the A1B emissions scenario. They used a selection criterion, similar to Stroeve et al. (2007, pp. 1–5), to constrain the number of models used by removing outliers so as to increase confidence in the projections used. Out of an initial set of 20 potential models, 11 models were retained for the Arctic-wide area, 4 were retained for the Kara/Laptev Sea area, 8 were retained for the East Siberian/Chukchi Sea, and 11 were retained for the Beaufort Sea (Overland and Wang 2007a, pp. 1–7). Using these constrained subsets, Overland and Wang (2007a, pp. 1–7) found that there is: ''considerable evidence for loss of sea ice area of greater than 40 percent by 2050 in summer for the marginal seas of the Arctic basin. This conclusion is supported by consistency in the selection of the same models across different regions, and the importance of thinning ice and increased open water at mid-century to the rate of ice loss.'' More specifically, Overland and Wang (2007a, pp. 1–7) found that ''By 2050, 7 of 11 models estimate a loss of 40 percent or greater of summer Arctic ice area. Six of 8 models show a greater than 40 percent ice loss in the East Siberian/Chukchi Seas and 7 of 11 models show this loss for the Beaufort Sea. The percentage of models with major ice loss could be considered higher, as two of the models that retain sea ice are from the same Canadian source and thus cannot be considered to be completely independent. These results present a consistent picture: there is a substantial loss of sea ice for most models and regions by 2050'' (see Figure 6). With less confidence, they found that the Bering, Okhotsk, and Barents seas have a similar 40 percent loss of sea ice area by 2050 in winter; Baffin Bay/Labrador shows little change compared to current conditions (Overland and Wang 2007a, pp. 1–7). Overland and Wang (2007a, pp. 1–7) also note that the CCSM3 model (Holland et al. 2006, pp. 1–5) is one of the models with the most rapid ice loss in the 21st century; this model is also one of the best at simulating historical 20th century observations (also see Figure 12 in DeWeaver (2007)).